

Maths Group Activity

Bacterial Growth Analyser Program

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Introduction

- Bacterial growth can be modeled using calculus
- Exponential model: $P(t) = P_0 e^{kt}$
- We use differentiation and integration to study population behavior

User Input Based Python Program

- User enters:
 - – Initial Population (P_0)
 - – Growth Constant (k)
 - – Start Time (a)
 - – End Time (b)
- Program computes outputs symbolically

Differentiation

- Instantaneous growth rate:
- $dP/dt = k P_0 e^{kt}$
- Shows how fast bacteria multiply at any moment

Integration

- Total bacteria added between $t=a$ and $t=b$:
 - $\int(dP/dt) dt = P(b) - P(a)$
 - Measures total growth over a period

Program Output

- Population at start time
- Population at end time
- Total bacteria added
- Fully user-driven and dynamic

Conclusion

- Calculus helps understand biological growth precisely
- User input makes model flexible
- Useful for microbiology, research, and education